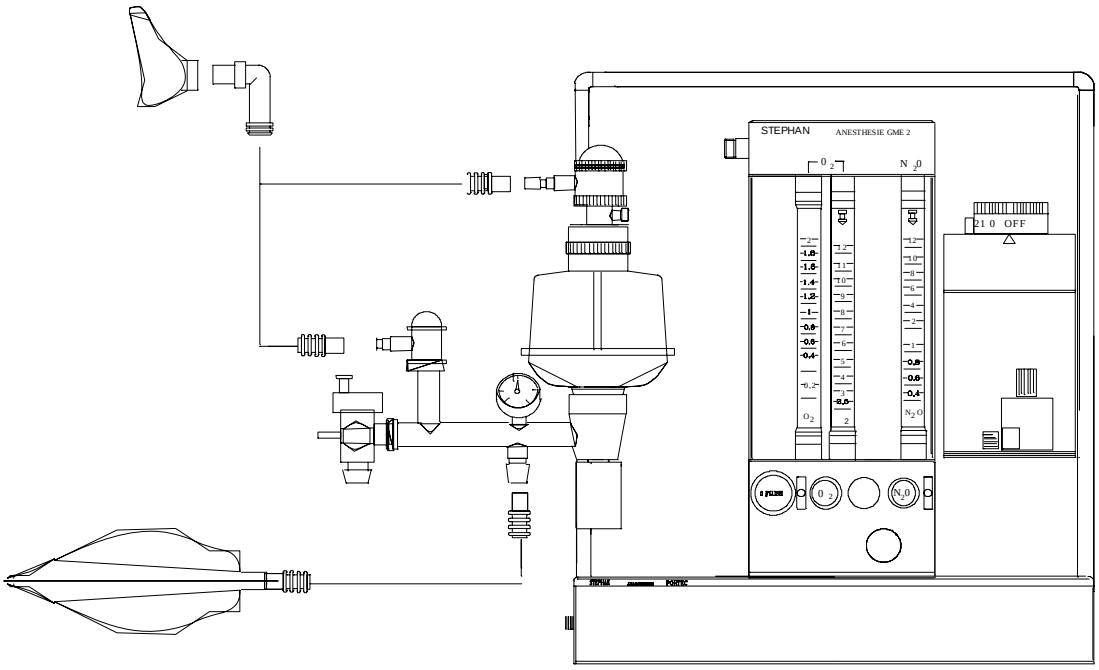
STEPHAN

Clinical Experience
Technical Competence

Artec / Portec

Anaesthesia Apparatus



Service Instructions

CE 0482

Service Instruction

Please carefully read each step of the procedure that is to be carried out before beginning the servicing of the unit. Always use the correct tools and the indicated measuring instruments. Any non-compliance with the instructions and/or recommendation found in this technical documentation can lead to a malfunctioning of the equipment or damage to it.

Use only original replacement parts as supplied by F. STEPHAN GMBH, and that are listed in the Replacement Parts List.

This technical documentation is not to be used in place of the operating instructions. Each operation and handling of the equipment requires exact knowledge and observance of the operating instructions. This equipment is only to be used for the stipulated application.

F. Stephan GmbH
- Medizintechnik -
Kirchstrasse 19

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Subject to technical changes.

Status: January 2009
Version: V1.3

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1 General Information

1.1 Equipment designation and manufacturer

Equipment designation Artec /Portec

Manufacturer

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1.2 Technical safety inspections

Technical safety inspections are to be carried out every six months by the manufacturer or an authorized Technical Service Team of F. STEPHAN GMBH.

1.3 Maintenance

For reasons of equipment safety and reliable functioning, it is recommended that the maintenance of the inhalation anesthesia units, **ARTEC / PORTEC,** also be carried out in conjunction with the semi-annual technical safety inspections.

Maintenance is to be carried out only by a service team authorized by F. STEPHAN GMBH.

When carrying out maintenance or servicing, use only those replacement parts that are supplied by F. STEPHAN GMBH.

1.4 Warranty

The manufacturer grants a 24-month warrant effective from the date of purchaser.

Any modification or repair work carried out on the equipment may only be done by F. STEPHAN GMBH or an authorized technical team. Otherwise the warranty becomes invalidated.

In validation of the warranty can also arise through improper handling and opertion of the equipment.

Claims Warranty claims that can be attributed to improper operation, insufficient care and maintenance shall not be honored by the manufacturer.

The manufacturer guarantees only for the safety and reliable operation of the equipment only if the operating and servicing instructions are strictly adhered to.

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2 Connections on part of the supply system

2.1 Check of the plug-in gas couplings O_2, N_2O, AIR for:

- correct color coding
- correct fit in the gas socket
- external damage

2.2 Check of the gas connection tubes O_2, N_2O, AIR, for:

- correct connection of the plug-in gas coupling
- correct connection to the screw joint of the connecting thread
- correct color coding
- external damages

2.3 Check of the screw joints of the connecting threads O_2, N_2O, AIR for:

- Tightness
- correct color coding of the individual types of gas
- damage to the thread

2.4 Check of the female connecting threads O_2, N_2O, AIR for:

- firm fit
- correct coding of the threads of the individual appliances
- correct color coding on the foil
- damage to the thread

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3 Description of Design and Performance

3.1 Gas-mixing-unit 2 and 3 (GME 2/GME 3)

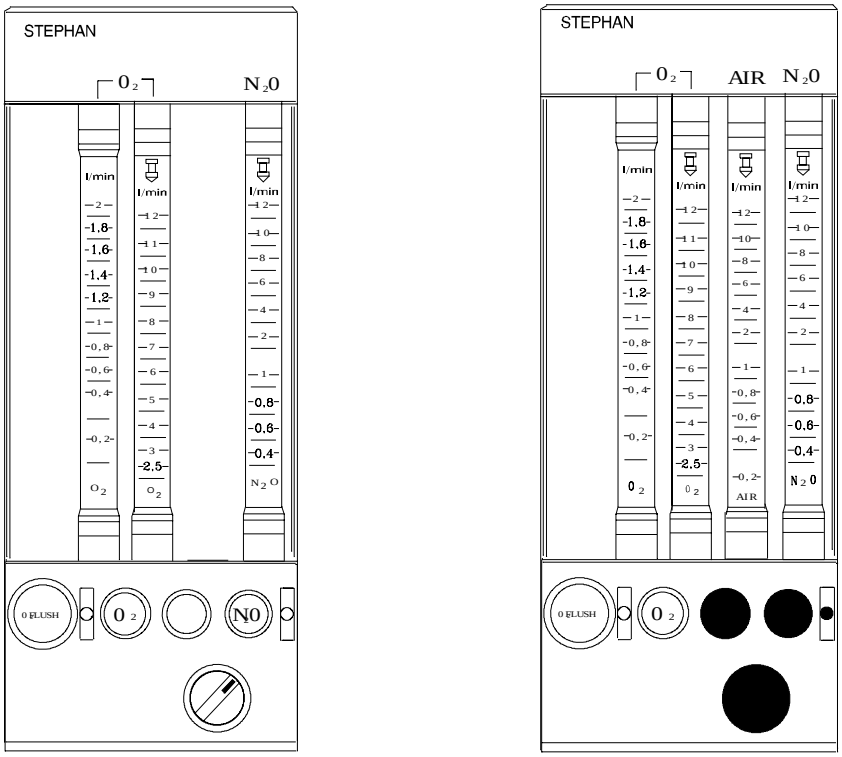

Fig. 1: GME 2 Art.Nr.: 1 150 61 070 GME 3 Art.Nr.: 1 150 61 071

The gas-mixing unit serves as proportioning device for medical gases (e.g. oxygen, nitrous oxide and compressed air).The desired gases can be mixed in any relation by means of the proportioning valves below the flowmeter tubes. The types of gas can be clearly recognized on the control knobs.

To prevent confusion, the control knob of the regulating valve for oxygen differs haptically from the two other valves. Inadvertent shift of the settings is avoided by a special twisting-prevention device.

The proportioning valves (control knobs) permit a continuous flow, when they are rotated counterclockwise. The measuring area for O_2 consists of two flowmeter tubes, so that an exact proportioning is guaranteed.

The high precision flowmeter tube (at the left) indicates the measuring range from 0 to 2 l/min, the "rough" flowmeter tube (at the right) indicates the flow quantities from 2 to 15 l/min.

Reading line is the upper edge of the float. Graduation of the lower scale parts of the measuring tubes (AIR/N_2O) is more closely stepped.

Because the dimensions of the lateral parts of the GME 2/3 can be altered optionally, the use of flowmeter tubes of other manufacturers (e.g. Rota, KDG and others) is possible.

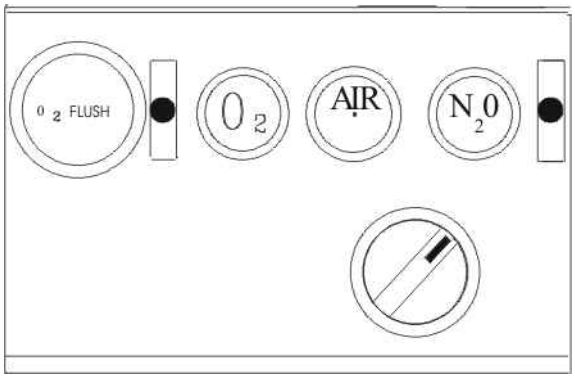

Fig. 2: Gas Mixing Unit

3.1.1 O_2-Flush

Depressing the O_2-flush-button effects a quick oxygen supply (approximately 50 l/min) directly to the outlet for fresh gas (not via the vaporizer for anaesthetic agent).

Releasing the O_2-flush-button effects return to the initial position.

3.1.2 AIR / N_2O-Change-Over

The AIR/N_2O-change-over-switch is situated below the respective control knobs (AIR/N_2O). It makes preselection of the gases AIR or N_2O possible. The appropriate proportioning of the gases is carried out by means of the regulating valves O_2-Failure Alarm.

In case of a decrease of pressure in the supply system (oxygen lower than 2,8 bar) an audible alarm sounds for at least 7 seconds. No muting is possible.

3.1.3 Nitrous Oxide Blocking

If pressure of oxygen further decreases to approximately 2 bar,the portion of N_2O is also reduced proportionally to the portion of oxygen. In case of a total failure of oxygen supply, the flow of N_2O is reduced to zero.

The readiness for service of the apparatus can only be restored by providing the prescribed pressure of oxygen of at least 2 bar at the connection with the supply system.

4 Vaporizer, Vaporizer holding device

4.1 Vaporizer

- Check setting wheel and stop for performance
- Check indication of filling level for damage
- Check drain screw for easy running and tightness
- Check performance of safety filling socket for performance
- Check locking device of vaporizer
- Verify concentration values of the vaporizer with the help of a testing device for anaesthetic gases
- maximum admissible tolerance in accordance with DIN 13252: +/- 20% of the set value or 0,2 Vol % absolute, always the higher value of the two.

4.2 Vaporizer holding device

- Check sealing valves for tightness
- Exchange O-rings
- Check for firm fit

5 Cylinder Supply Unit

- Performance test of the high-pressure gauges for N_2O and O_2
- Check of the connections for supply cylinders
- Check of correct coding of threads
- Check of the packings of the supply cylinders
- Check screw joints and pipe installations for tightness and damages
- Check housing for damages
- Check attached components for firm fit

6 Circle System

6.1 Design and Description of Performance

The circle system together with the patient forms a closed cycle, into which fresh gas is fed via the fresh gas pipe line. Excess gas escapes through the excess gas valve (10)from the cycle and is removed from the field of activity of the anaesthetist by means of the suction system for anaesthetic gas (13).During the inspiration phase, the gas contained in the system is transported to the patients' lungs by effecting pressure, produced either by the respirator or by manual operation of a respiratory bag. The consequent PRESSURE RELIEF in the system during the expiration phase and the increase of pressure in the lungs due to the elasticity of the thorax makes the gas flow back out of the lungs. Thereby it is the task of the inspiration valve (1) and the expiration valve (7) to permit the flow of gas only in one direction and so to establish the cycle. Prior to reaching the patient again, CO_2 is removed in the two absorbers (2). Humidity and heat given off by the patient are fed back to him in such a semi-closed system, which prevents desiccation and excessive cooling of the airways. The fresh gas feeder is located on the lower end of the holding tube. The adjustability of elevation and the possible swivelling stand for a good adaptation to the local conditions of the operating theatre. The respiratory pressure gauge(3), which can be slipped onto the holding device of the circle system, has a measuring range from - 10 to 100 mbar. It can be replaced by a blind plug.

As a standard, a mechanic volumeter (9) is installed below the expiration valve, which measures all expiratory values of respiratory volume. The measuring of O_2-concentration, required

in accordance with DGAI, is carried out by means of a polarographic cell (by Clark) (1) at the head of the inspiration valve. Moreover, the circle system is provided with connection tapers in accordance with ISO respectively DIN 13 252, so that corrugated tubes for the ventilation of adults as well as tube systems for infants can be used. The excess valve (10) serves to carry off spent respiratory gases. It can be operated in four different adjustments.

6.1.1 CL (closed)

The valve is completely closed. This setting is necessary for operation in respirator mode. In this mode, the spent respiratory gases are evacuated via the ejector on the patient component during the expiration phase.

6.1.2 Pressure Range from 5mbar to 50mbar

This setting is used to limit the maximum pressure during manual ventilation. When the set pressure is reached, the valve evacuates.

6.1.3 Spontaneous Respiration

During spontaneous respiration of the patient under light anaesthesia, the valve closes in the inspiration phase, the patient now breathes the fresh gas provided by the apparatus. In the expiration phase, the valve opens and evacuates the system until ambient pressure is reached.

This setting is to be used in case of assisted ventilation with the patient triggering the respiration and the respirator deepening the respiration. Aside of that, it is possible to switch to SP briefly in case of manual ventilation in the pressure range of 5 to 50 mbar to evacuate an overfilled respiratory bag.

6.1.4 VOL (volume-controlled ventilation)

With the valve setting VOL, the circle system is closed automatically to guarantee supply of the patient with the desired respiratory working volume. Spent and excess respiratory gases escape from the valve at the end of the expiration phase. During the expiration phase, pressure in the system never rises above 1,5 mbar.

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6.1.5 Circle System

- Check performance of inspiration- and expiration valve and contact surfaces of the valves for damages
- Check tapers and taper seats for damages
- Check absorber for damages and tightness
- Check performance of respiratory pressure gauge
- Check setting values and performance of the Berner-valve
- Check fresh-gas-feed for passage of flow and tightness
- Check tube system, Y - piece and mask
- In the course of semi-annual servicing, all packings and O-rings must be exchanged.

7 Performance Test

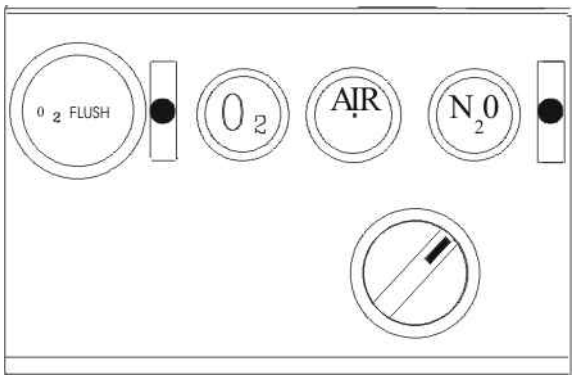

Fig. 3: Gas Mixing Unit

Proportioning valves (1) on flowmeter unit closed

7.1 Execution of the Test

- Cautiously open the proportioning spindle for oxygen while observing the respiratory pressure gauge (2). Fill pipe line system, until the respiratory pressure gauge comes to a standstill at constantly 60 mbar.
- The float of the oxygen flowmeter now indicates the dimension of the leakage.

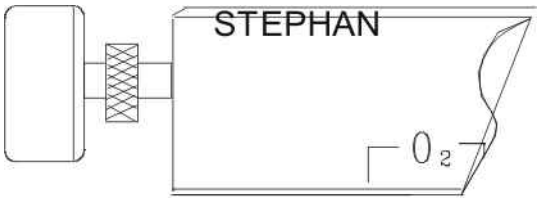

Fig. 4: Proportioning spindle for oxygen

7.2 O_2-Flush

Attention

Do not use in the application described above. You will destroy the manometer.

Prior to putting the apparatus into service, it must be verified, that the O_2-flush-valve closes immediately and automatically after the key has been released. For this test, the flush-key must be depressed briefly. When released, it must return immediately to its initial position.

7.3 Air / N_2O-Change Over (Basic setting)

- O_2 - proportioning valve closed
- N_2O-proportioning valve set at 3 l/min
- Proportioning valve for AIR set at 3 l/min
- Change-over-switch in "N_2O" – position
- Suction system for anaesthetic gas connected
- O_2-monitor calibrated and in operation

7.3.1 Execution of the Test

- The flowmeter tube for N_2O must indicate 3 l/min, while the flowmeter tube for compressed air must give a reading of zero. The O_2-monitor indicates ca. 0% O_2 (after a brief delay).
- When changing over from N_2O to AIR (Change-over-switch)
- without altering the settings of the proportioning valves
- the float of the N_2O-flowmeter tube must return to zero, while in parallel the reading of the flowmeter tube for compressed air must rise to 3 l/min. As a confirmation, the O_2-monitor shows a reading of 21 % O_2.

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7.4 Check of types of gas and test of the safety devices

(Nitrous oxide blocking and O_2-failure-alarm)

- Apparatus in operating mode
- Suction system for anaesthetic gas connected
- Spindles of all proportioning valves opened to 3 l/min
- Change-over-switch for AIR/N_2O in N_2O-position

7.4.1 Execution of the Test

Separate angular plug for O_2 from supply system

The flow of oxygen must decrease continuously

The O_2-failure alarm sounds, when line pressure reaches approximately 2,8 bar

When pressure further decreases to approximately 2 bar, the nitrous-oxide-blocking must set in and lower the N_2O flow in parallel to the oxygen flow, until, with the system completely emptied, both volume flows have decreased to zero.

Oxygen supply is restored by inserting the angular O_2-plug.

When the N_2O-supply is interrupted, only the N_2O-flow drops to zero

After restoring of the nitrous-oxide-supply, finally change over to AIR and separate this gas from the supply pipe line. Here as well the flow of N_2O must drop to zero.

7.4.2 Proportioning Valves

When the proportioning valves are closed, the respective floats of the corresponding flowmeter tubes must move back to the zero position. If this is not the case, a leakage of the respective spindle exists, which must be eliminated by the service technician.

When carrying out this test, do not forget to change over from N_2O to AIR!

7.5 Tightness of the Circle System

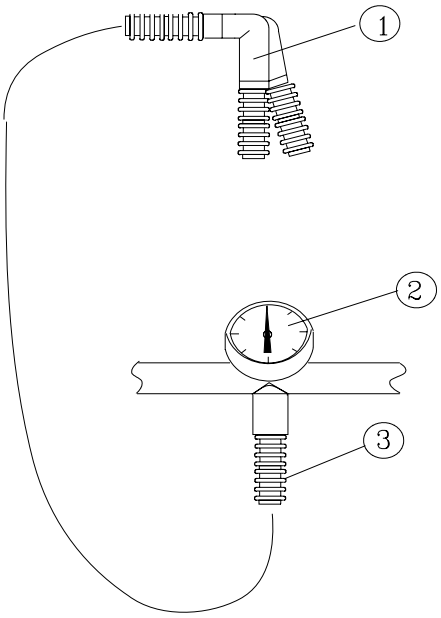

Fig. 5: Y – piece, feed line for control gas, rspiratory pressure gauge

1 y – piece
2 respiratory pressure gauge
3 feed line for control gas

7.5.1 Basic setting

- Flow-regulating valves on flowmeter unit **closed**
- Pressure-regulating valve in position CL
- Remove mask from Y – piece
- Slip feed line for control gas (3) onto the Y - piece, so that the circle system forms a closed space.

7.5.2 Execution of the Test

- While observing the respiratory pressure gauge (2), the zero-position of which has been verified beforehand, cautiously open the flow-regulating valve for oxygen, until the pressure gauge comes to a standstill at constantly 60 mbar.
- Read off the quantity of escaping gas at the corresponding flowmeter tube
- If leakage is less than 250 ml/min, the circle system is sufficiently tight for operation
- If the value of 250 ml/min is exceeded, the following items must be checked:
- Tightness of connecting tapers
- Tightness of screw joints
- Packings and O – rings
- Corrugated tubes for damages
- If after a repeated tightness test the inadmissibly large leakage could not be eliminated, the service department must be notified.

7.6 Test of the pressure-regulating valve

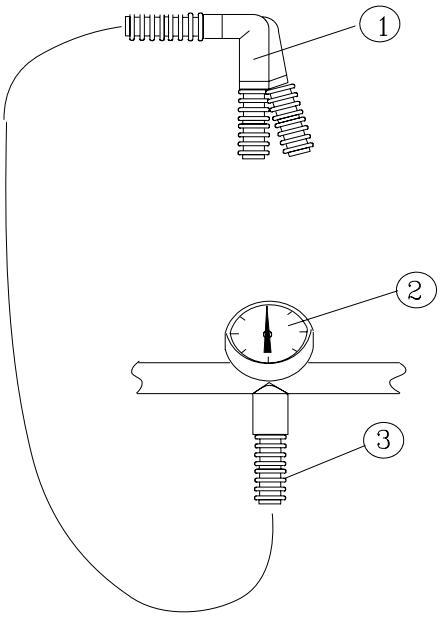

Fig. 6: Y – piece, feed line for control gas, rspiratory pressure gauge

1 y – piece
2 rspiratory pressure gauge
3 feed line for control gas

7.6.1 Basic setting

- Circle system in operating mode
- Calibrate respiratory pressure gauge
- Remove mask from y - piece
- Slip feed line for control gas (3) onto the Y - piece (1), so that the circle system forms a closed space.

7.6.2 Execution of the Test

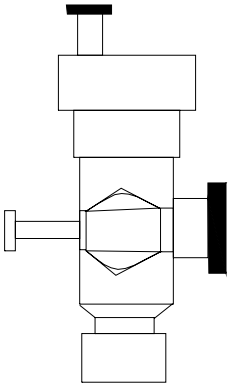

Fig. 7: Pressure regulating valve

- Adjust the flow of oxygen to 5 l/min
- Cover the values imprinted on the pressure regulating valve and control them by means of the respiratory pressure gauge.

Attention

Do not go beyond 50 mbar, otherwise there is danger of overload.

- Tolerance: +/- 5 mbar
- If tolerance limits are exceeded, exchange of the valve is necessary.

7.7 Test of inspiration-and expiration valve

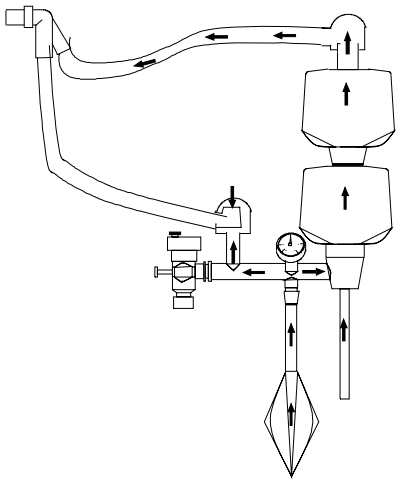

Fig. 8: Test of inspiration-and expiration valve

7.7.1 Basic setting

- Circle system in operating mode
- Remove mask from Y – piece
- Connect the Y - piece with a test lung
- Adjust fresh gas flow to 2 l/min
- Limit pressure regulating valve to 35 mbar

7.7.2 Execution of the Test

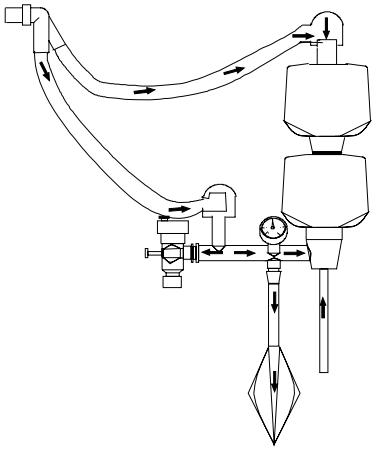

Fig. 9: Test of inspiration- and expiration valve

- Simulate a ventilation
- During the inspiration phase , the valve disc of the inspiration valve is lifted by the gas flow and simultaneously, the valve disc of the expiration valve is depressed.
- During the expiration phase, the valve disc is lifted and the inspiration valve remains closed.
- If the valves do not react in this way, the cause must be determined and eliminated.

Possible causes

- Sticky valve disc
- Missing valve disc
- Damaged sealing edges of the respective valve

8 Diagram of pneumatic control system

8.1 Pneumatic control system O_2 / N_2O / AIR

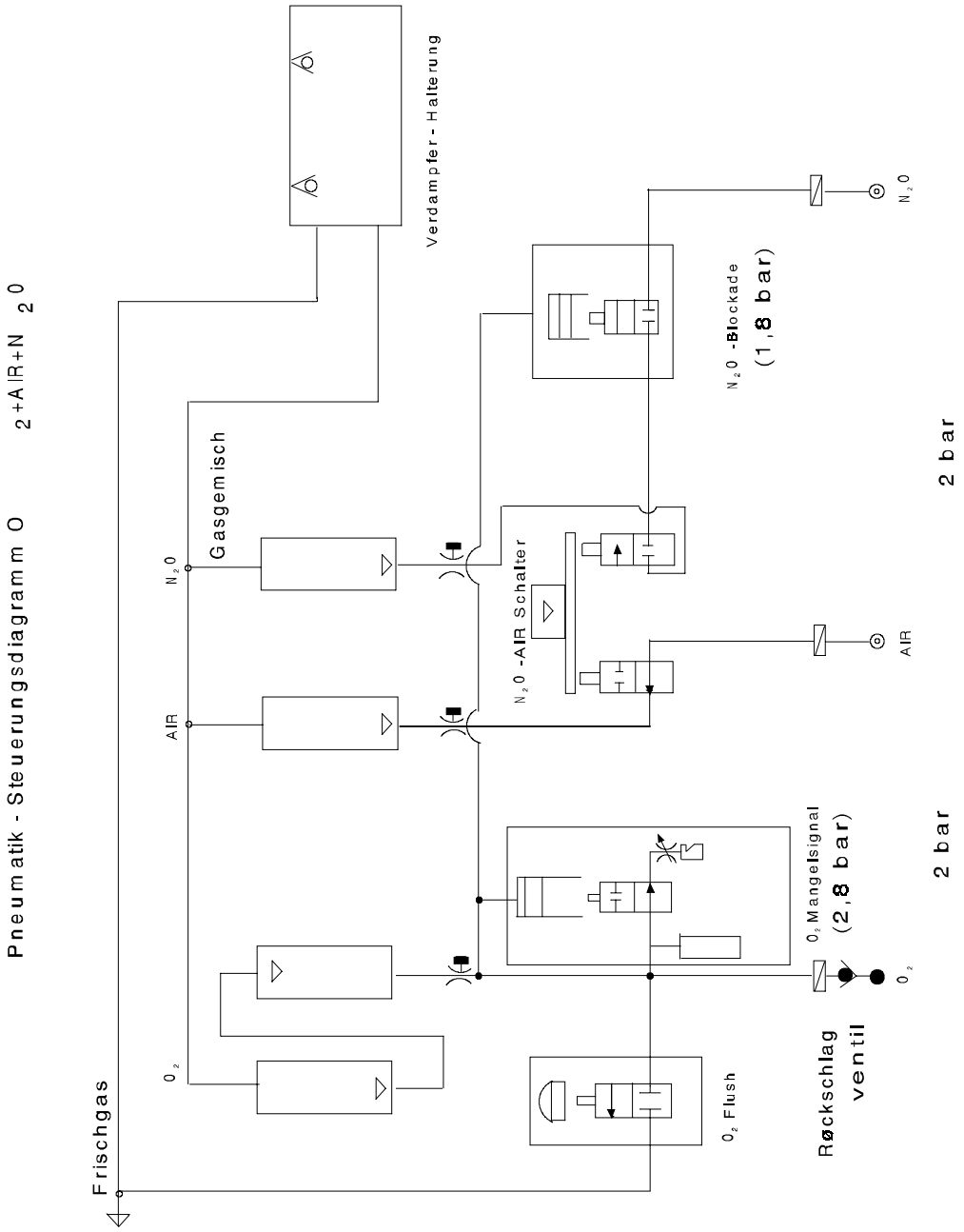

Fig. 10: Diagram of pneumatic control system O_2, N_2O, AIR

8.2 Pneumatic control system O_2 / N_2O

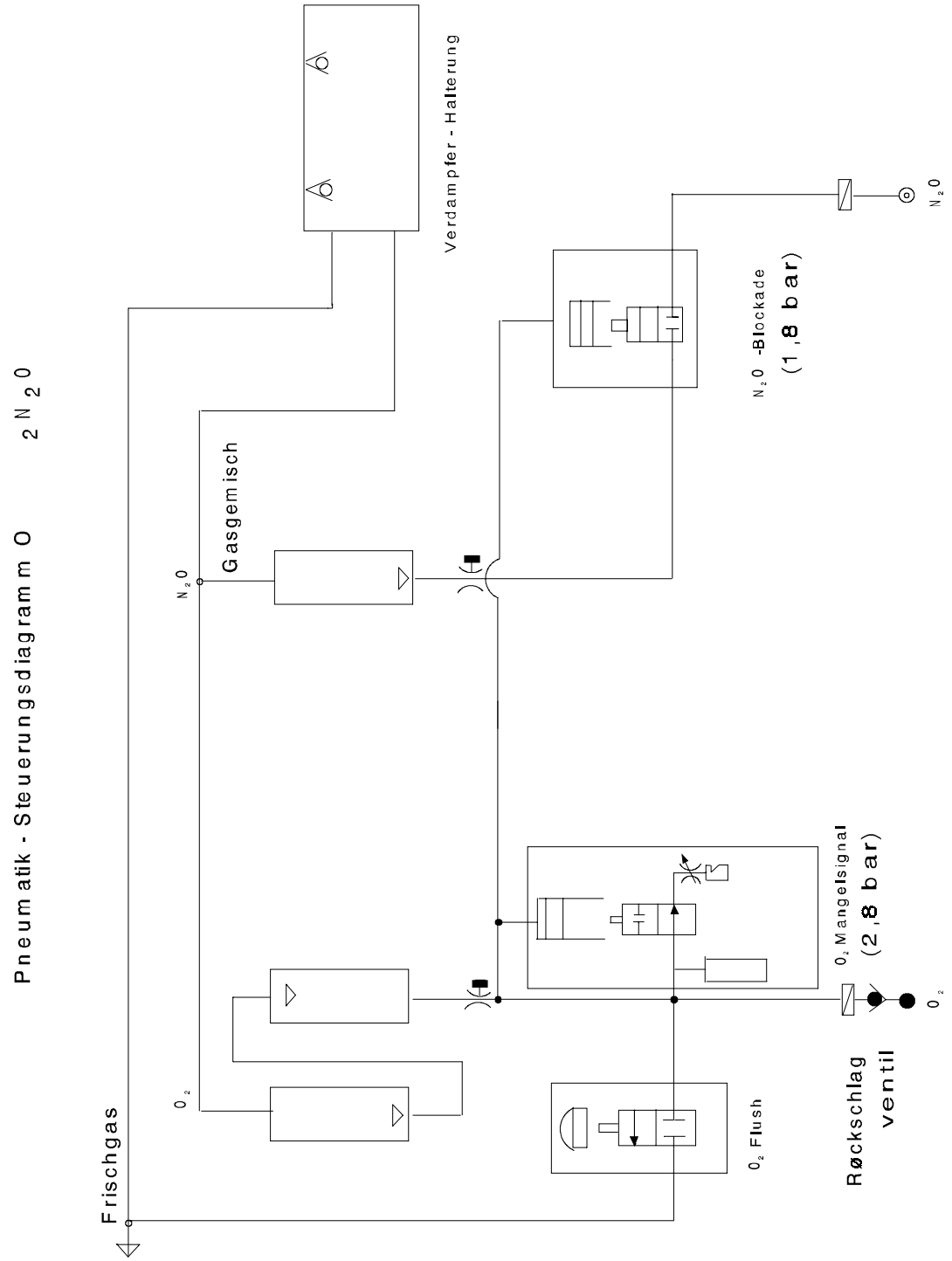

Fig. 11: Diagram of pneumatic control system O_2, N_2O

9 Troubleshooting Guide

9.1 Portec

Fault	Possible cause	Elimination of fault
Floats of the flowmeter tube do not return to zero	Flowmeter tube contaminated	Clean flowmeter tube
When changing over by means of the AIR/N_2O-change-over-switch, the gas that has not been selected flows (indicated by theO_2-Monitor)	Change-over valve is not tight	Exchange of the change-over valve by service department
Oxygen concentration too high	Proportioning valve for oxygen is not tight	Loosen control knob and readjust (Service)
Flush-valve does not close properly		Exchange of the flush-valve by the service department
Failure-of oxygen-supply	Supply pressure is too low	Increase setting of pressure reducer of supply cylinder
Valves defective		Exchange of valves by service personnel

Tab. 1: Troubleshooting Portec

9.2 Circle System

Fault	Possible cause	Elimination of fault
No pressure is building up in the circle system	Leakage in the circle system	Tightness test of the circle system
Pressure regulating valve not closed or not tight		Close pressure regulating valve
Respiratory resistance too high (becomes evident by delayed buildup of pressure resp. decrease of pressure)	Valve disc sticks in the valve box	Clean flap valves
The pressure indicated by the respiratory pressure gauge is higher than the pressure set on the pressure regulating valve	Pressure regulating valve is incorrectly calibrated Pressure gauge is incorrectly calibrated	See functional capability of the pressure regulating valve Calibrate the respiratory pressure gauge

Tab. 2: Troubleshooting Circle System

10 Technical Data

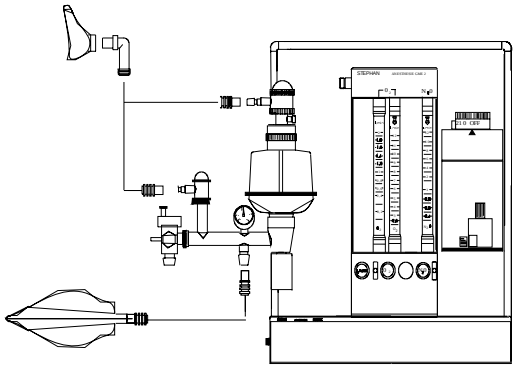

Fig. 12: Technical Data

10.1 Dimensions

- Weight of the system: ca. 9 kg (16kg)
- Length: 330 mm
- Height: 800 mm
- Width 350 mm

10.2 Type of gas connections

- O_2: M 12 X 1
- AIR: M 20 X 1,5
- N_2O: M 14 X 1
- Fresh gas M 16 X 1,5
- Pressure of supply system 5 bar +/- 0,5 bar

10.3 Measuring range of the flowmeter tubes

- O_2 (high precision) 0 to 2 l/min
- (rough) 2 to 15 l/min
- AIR 0 to 15 l/min
- N_2O 0 to 15 l/min

10.4 Accuracy of the flowmeter tubes

- +/- 10 % of the respective terminal value of the scale.
- In case of integrated high precision measuring range
- +/- 10 % of the terminal value of this measuring range (under standard conditions of 20°C and 1,013 bar)

10.5 O_2-Failure alarm

- Trigger pressure: 2,8 bar
- Duration of audible alarm: 7 seconds
- N_2O - Blocking Trigger pressure: 2,0 bar

10.6 Technical Data Circle System

- Volume of the complete circle system with 2 absorbers and tubes: ca. 3 l
- Weight: ca. 5,5 kg
- Length: 330 mm
- Height: 800 mm

Pressure gauge

- Pressure range: -10 mbar to 100 mbar
- Tolerance: +/- 5 % of the set value
- Pressure regulating valve: 0 to 50 mbar
- Pressure range: 0 to 50 mbar
- Tolerance: +/- 5 mbar

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11 List of spare parts

11.1 Circle system

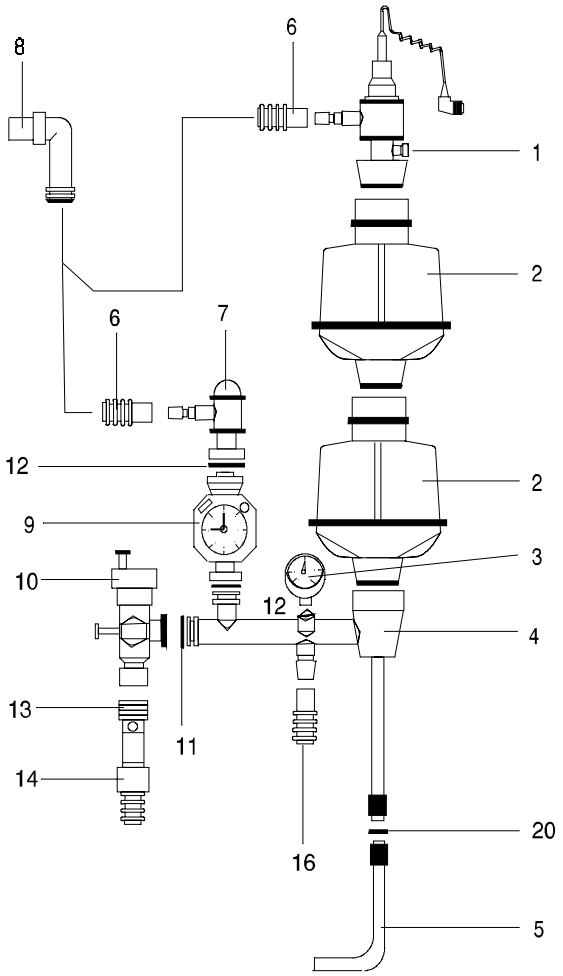

Fig. 13: spare parts circle system

Item	Designation	Article No.
1	Inspiration valve	1 155 61 004
2	Absorber jar, compl.	1 155 61 003
3	Pressure gauge10 mbar to 50 mbar	1 923 60 004
4	Base holding device of circle system	1 155 42 002
5	Connection tube of circle system	1 155 61 034

Item	Designation	Article No.
6	Corrugated tube 1 m	1 952 60 011
7	Expiration valve	1 155 61 005
8	Y - piece	1 701 60 403
9	Mechanical volumemeter Haloscale	1 155 60 040
10	Pressure regulating valve 0 to 50 mbar	1 155 60 006
11	Flat packing 33 x 21 x 2	1 951 60 004
12	Flat packing 29 x 21 x 1,5	1 951 60 003
13	Adapter for suction system anaesthetic gas	1 155 60 036
14	Tube for suction system 1 m	1 952 60 016
15	Plug for suction system for anaesthetic gas	1 155 60 037
16	Corrugated tube 1,5 m	1 952 60 012
17	Respiratory bag 2 liter, without reinforcement	1 952 60 013
18	ISO - adapter A	1 155 60 038
19	ISO - adapter I	1 155 60 039
20	Flat packing	1 951 40 007

Tab. 3: spare parts circle system

11.1.1 Semi-annual servicing circle system

Item	Designation	Article No.
11	Flat packing 33 X 21 X 2	1 951 60 004
12	Flat packing 29 X 21 X 1,5	1 951 60 003
20	Flat packing	1 951 60 007

Tab. 4: List of parts for exchange on the occasion of semi-annual servicing

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11.2 Absorber

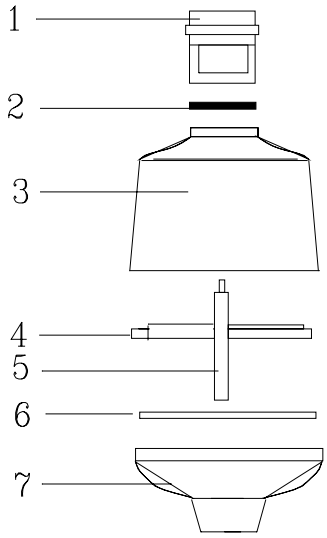

Fig. 14: spare parts absorber

Item	Designation	Article No.
1	Absorber - top	1 155 62 026
2	O-ring 50,47 x 2,62	1 950 60 024
3	Absorber jar	1 155 60 025
4	Absorber packing	1 951 40 005
5	Fastening bolt	1 155 60 028
6	Sieve for absorber	1 924 60 003
7	Absorber bottom	1 155 62 003

Tab. 5: spare parts Absorber

11.2.1 Semi-annual servicing Absorber

Item	Designation	Article No.
2	O-ring 50,47 x 2,62	1 950 60 024
4	Absorber packing	1 951 40 005

Tab. 6: List of parts for exchange on the occasion of semi-annual servicing

11.3 Expiration valve

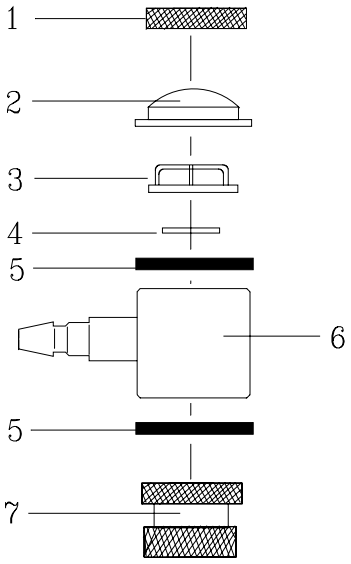

Fig. 15: spare parts expiration valve

Item	Designation	Article No.
1	Cap ring	1 155 62 012
2	Valve cap	1 155 60 015
3	Valve cage	1 155 62 014
4	Valve disc	1 155 62 015
5	O-ring 34,5 x 3,5	1 950 60 023
6	Expiration-valve-box	1 155 62 018
7	Expiration-valve-bottom	1 155 61 020

Tab. 7: spare parts expiration valve

11.3.1 Semi-annual servicing expiration valve

Item	Designation	Article No.
4	Valve disc	1 155 62 015
5	O-ring 34,5 x 3,5	1 950 60 023

Tab. 8: List of parts for exchange on the occasion of semi-annual servicing

11.4 Inspiration valve

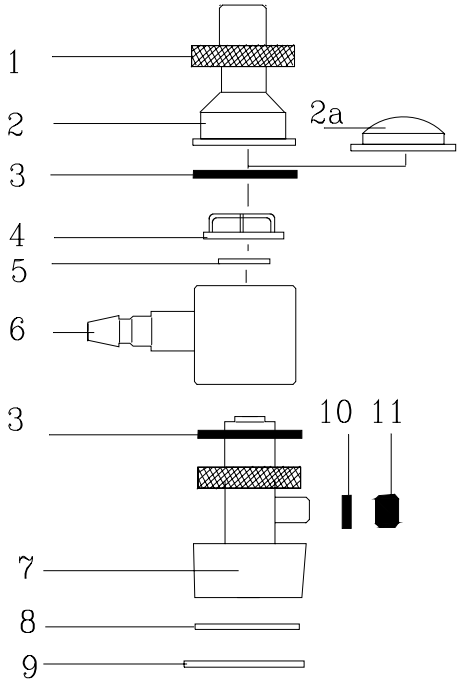

Fig. 16: spare parts inspiration valve

Item	Designation	Article No.
1	Cap ring	1 155 62 012
2	Seat for O2-sensor	1 155 60 032
2a	Valve cap	1 155 60 015
3	O-ring 34,5 x 3,5	1 155 60 023
4	Valve cage	1 155 62 014
5	Valve disc	1 155 62 015
6	Inspiration-valve-box	1 155 62 016
7	Inspiration-valve taper, complete	1 155 61 009
8	Spring ring, circle system	1 919 60 001
9	Filter of inspiration valve	1 924 60 001
10	O-ring 9 x 2	1 950 60 005
11	Cap nut M 16	1 155 62 033

Tab. 9: spare parts inspiration valve

11.4.1 Semi-annual servicing inspiration valve

Item	Designation	Article No.
3	O-ring 34,5 x 3,5	1 155 60 023
5	Valve disc	1 155 62 015
10	O-ring 9 x 2	1 950 60 005

Tab. 10: List of parts for exchange on the occasion of semi-annual servicing

11.5 Artec / Portec

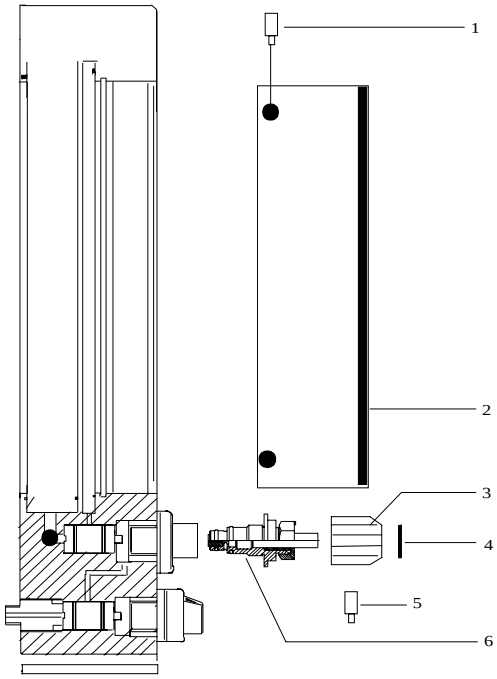

Fig. 17: spare parts Artec / Portec

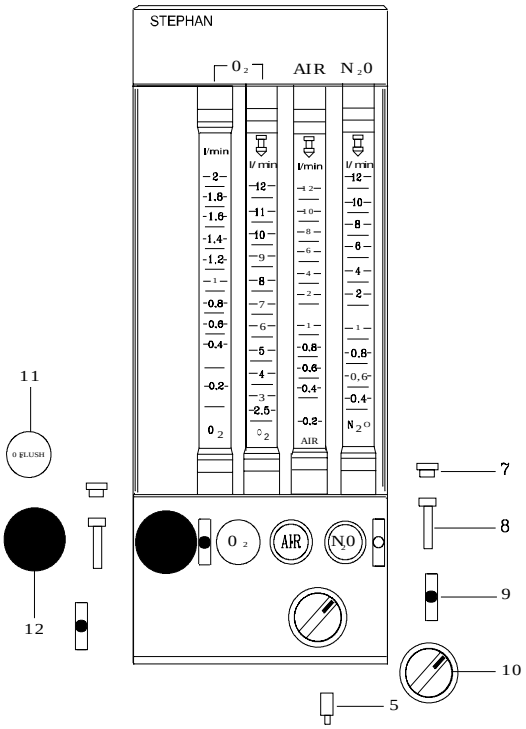

Fig. 18: spare parts GME

Item	Designation	Article No.
1	Flathead screw M 14 x 12 black	1 910 60 001
2	Covering of flowmeter tubes	1 150 30 025
3	Control knob O_2 N_2O	1 926 60 010 1 926 60 011
4	Lexan foil O_2 AIR N_2O	1 902 60 710 1 902 60 713 1 902 60 711
5	Threaded pin M 5x5	1 910 60 003
6	Proportioning valve	1 150 41 019
7	Cover plug 6,6 / 5	1 922 60 001
8	Pan head screw M 2,5 X 20	1 910 60 005
9	Twisting-prevention device	1 150 42 018
10	Selector switch AIR - N_2O	1 150 60 074
11	Lexan foil "O_2-Flush"	1 902 60 712
12	O_2 - flush - key	1 150 60 073

Tab. 11: spare parts Artec / Portec

11.6 Vaporizer

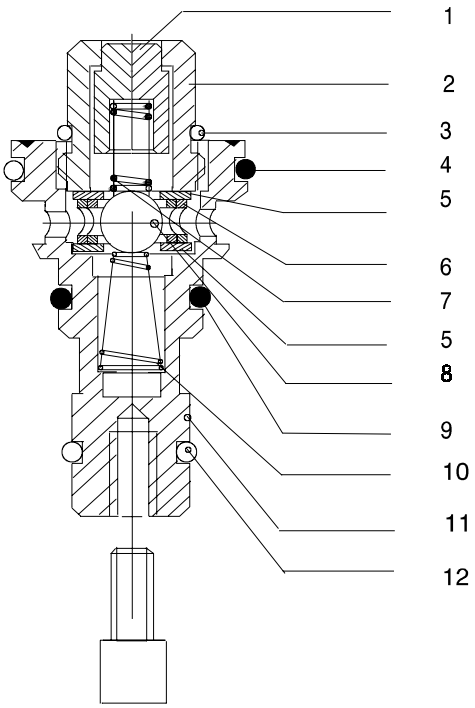

Fig. 19: spare parts vaporizer

Item	Designation	Article No.
1	Thrust pin of latching device	1 151 42 007
2	Plug bolt of latching device	1 151 42 001
3	O - ring 13,94 x 2.62	1 950 60 010
4	O - ring 22 x 2	1 950 60 016
5	Packing for ball, diameter 8 mm	1 951 40 002
6	Ball cage	1 141 40 005
7	Compression spring, top	1 151 40 009
8	Ball, diameter 8 mm	1 921 60 001
9	O - ring 12,42 x 1,78	1 950 60 008
10	Conical compression spring, bottom	1 151 40 010
11	Cartridge valve	1 151 32 003
12	O - ring 9 x 2	1 950 60 005

Tab. 12: spare parts vaporizer

11.7 Flowmeter tube

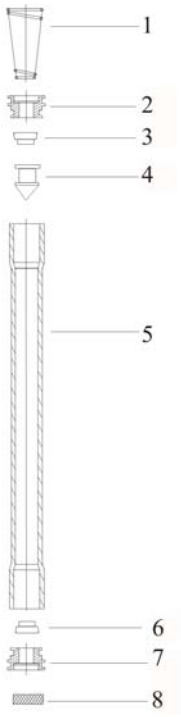

Fig. 20: spare parts flowmeter tube

Item	Designation	Article No.
1	Conical compression spring	1 920 40 004
2	Packing disc with O-ring 5,28 x 1,78 and O-ring 12,42 x 1,78	1 150 42 021 1 950 60 002 1 950 60 008
3	End plug	
4	Float	1 950 60 008
5	Flowmeter tube 0,1 to 2 l/min O_2 2 to 12 l/min O_2 0,2 to 12 l/min AIR 0,2 to 12 l/min N_2O	1 150 40 013 1 150 40 007 1 150 40 009 1 150 40 008
6	End plug	
7	Packing disc with O-ring 5,28 x 1,78 and O-ring 12,42 x 1,78	1 150 42 021 1 950 60 002 1 950 60 008
8	Filter for flowmeter tube	1 924 60 003

Tab. 13: spare parts flowmeter tube

11.8 Spindle

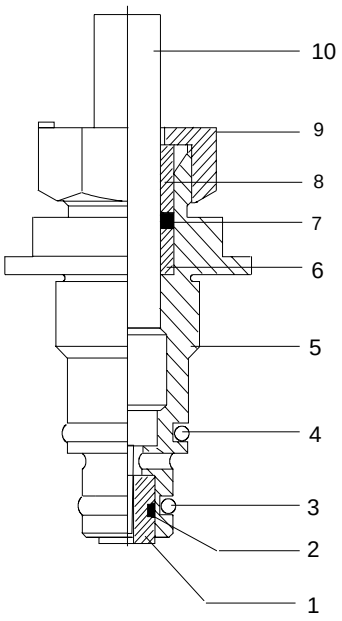

Fig. 21: spare parts spindle

Item	Designation	Article No.
1	Packing inset for spindle	1 150 40 014
2	O – ring 3 x 1	1 950 60 001
3	O – ring 6 x 1,8	1 950 60 027
4	O – ring 7,65 x 1,78	1 950 60 004
5	Spindle housing	1 150 32 016
6	Sliding bearing bushing 6 / 9 / 4	1 150 60 027
7	Sliding ring, spindle	1 150 40 010
8	Sliding bearing bushing 6 / 9 / 6	1 150 60 026
9	Nut M 12 x 1, spindle	1 150 42 015
10	Proportioning spindle	1 150 40 011

Tab. 14: spare parts spindle

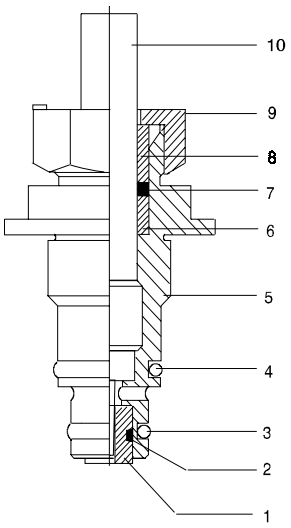

Fig. 22: spare parts spindle

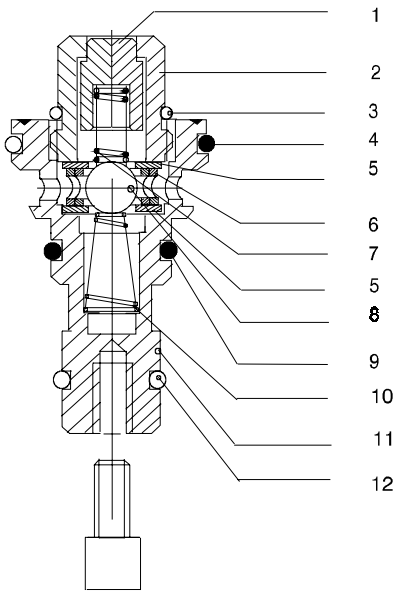

Fig. 23: spare parts spindle

The parts listed below must be exchanged on occasion of the prescribed semi-annual servicing.

Item	Designation	Article No.
1	Packing inset for spindle	1 150 40 014
2	O – ring 3 x 1	1 950 60 001
Latching device, type Vapo – Typ TEC 4		
3	O – ring 6 x 1,8	1 950 60 027

Tab. 15: spare parts spindle

11.9 Instruction Flowmeter tube

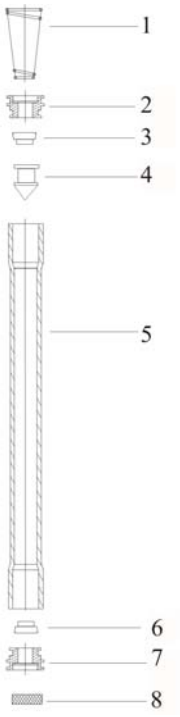

Fig. 24: spare parts flowmeter tube

After removing the packing sets (2) and (7),the end plugs (3) and (6) can be pulled out of the flowmeter tube with the help of a pair of pincers and the float can be taken out.

Attention

The floats, together with the corresponding flowmeter tubes, form a calibrated system, so that an interchanging must be avoided by all means.

Now the flowmeter tube can be rinsed first with soap suds and then with clear water.The completely dry tube can be re-installed. After the plexiglass hood has also been cleaned, the cover of the flowmeter tube can be screwed up again.

Item	Designation	Article No.
8	Filter for flowmeter tube	1 924 60 003

Tab. 16: spare parts flowmeter tube

Item 6 must be exchanged on occasion of the semi-annual servicing

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12 Measuring of electrical power leakage

To the **ARTEC** – apparatus belong in accordance with MedGv the two independent monitors. The O_2-monitor for determinationof the FiO_2 and the anaesthesia gas monitor for supervision of the concentration of anaesthetic gas.

These electrically operated instruments must, in accordance with their own service instructions, undergo a measuring of electrical power leakage.

13 Servicing

In accordance with MedGV (Ordinance on medical appliances), medico-technical appliances must undergo an inspection in regular intervals of time.

This inspection must be carried out only by authorized persons (service technicians) of the supplier of the appliance.

Periodical maintenance generally is semi-annual.

Best guarantee is a service contract, providing for a semi-annual rhythm of inspections with automatic exchange of the working parts.

If servicing is carried out by unexperienced, unauthorized persons, the liability of the manufacturer for safe performance of the apparatus automatically becomes void.

14 Test Certificate

Herewith we confirm the orderly execution of the semi-annual servicing in accordance with the service instructions on hand, based on the regulations of the MedGV.

F. Stephan GmbH

Gackenbach

Place _____

Date _____

15 Acceptance of the apparatus

Herewith we confirm the acceptance of the serviced inhalation apparatus **ARTEC**. Performance of the apparatus and the observance of the prescribed safety regulations have been verified by us.

Clinic _____

Place _____

Date _____

Responsible for operating the apparatus

_____

(Signature)

Fresh gas Gas mixture ☐

Vaporizer holding device ☐

N_2O/AIR-change-over switch ☐

O_2-flush _____ N_2O blocking ☐

Relief valve O_2-failure-of-supply alarm ☐

_____ 2 bar _____ 2 bar ☐

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18 Notes

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